09/806 EL915796642US

Express Mail No. EL915796642US

IN THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US)

526 Rec'd PCT/PTO 13 JUL 2001

Applicant(s): Jong Woo LEE

U.S. Serial No.: 09/806,172

INTERNATIONAL APPLICATION NO.: PCT/KR00/00811

INTERNATIONAL FILING DATE: 27 July 2000

For: "ADAPTER HAVING SECURE FUNCTION AND COMPUTER SECURE SYSTEM USING IT"

Re: RESPONSE TO NOTIFICATION OF MISSING REQUIREMENTS UNDER 35 U.S.C. 371 IN THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US)

Group Art Unit: not yet assigned

Our Ref.: B-4151PCT 618701-2

Date: July 13, 2001

Commissioner for Patents
BOX PCT
United States Patent and Trademark Office
Washington, D.C. 20231

Attn: Charitta A. Burt, Paralegal
U.S. National Stage Processing
PCT International Division

07/18/2001 MNGUYEN 00000144 09806172
01 FC:254 65.00 OP

Dear Ms. Burt:

In response to the Notification of Missing Requirements Under 35 U.S.C. 371 in the United States Designated/Elected Office (DO/EO/US) dated May 16, 2001 (copy enclosed) and the Notification of a Defective Oath or Declaration dated May 16, 2001 (copy enclosed), please find enclosed the following:

1. Declaration/Power signed by inventor Jong Woo LEE identifying the application by U.S. application number, PCT international application number, and PCT international filing date;

2. Check in the amount of $65.00 to cover the small-entity surcharge for providing the oath or declaration later than the appropriate 20 or 30 months from the priority date; and

3. A Verified Statement that this filing is by a small entity with a separate cover sheet.

CHECK PROPER BOX(ES) FOR ANY OF THE FOLLOWING ADDED PAGES(S) WHICH FORM A PART OF THIS DECLARATION

[ ] Signature for third and subsequent joint inventors. *Number of pages added* ___

[ ] Signature by administrator(trix), executor(trix) or legal representative for deceased or incapacitated inventor. *Number of pages added* _____

[ ] Signature for inventor who refuses to sign or cannot be reached by person authorized under 37 CFR 1.47. *Number of pages added Added* pages to combined declaration and power of attorney for divisional, continuation-in-part (CIP) application. *Number of pages added* _____

* * *

[ ] Authorization of attorney(s) to accept and follow instructions from representative.

* * *

If no further pages form a part of this Declaration then end this Declaration with this page and check the following item.

[x]This declaration ends with this page.

JC14 Rec'd PCT/PTO 28 MAR 2001
Express Mail No. EL652176640US

FORM PTO-1390 (REV 10-2000)

U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371

ATTORNEY'S DOCKET NUMBER: B-4151PCT 618701-2

U.S. APPLICATION NO. (If known, see 37 CFR 1.5): not yet assigned 09/806172

INTERNATIONAL APPLICATION NO.	INTERNATIONAL FILING DATE	PRIORITY DATE CLAIMED
PCT/KR00/00811	27 July 2000	29 July 1999

TITLE OF INVENTION: "ADAPTER HAVING SECURE FUNCTION AND COMPUTER SECURE SYSTEM USING IT"

APPLICANT(S) FOR DO/EO/US: Jong Woo LEE

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. [X] This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. [ ] This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. [X] This is an express request to promptly begin national examination procedures (35 U.S.C. 371(f)).
4. [X] The US has been elected by the expiration of 19 months from the priority date (PCT Article 31).
5. [X] A copy of the International Application as filed and as published.
   a. [XX] is attached hereto (required only if not communicated by the International Bureau).
   b. [XX] has been communicated by the International Bureau.
   c. [ ] is not required, as the application was filed in the United States Receiving Ofice (RO/US).
6. [ ] An English language translation of the International Application as filed (35 U.S.C. 371(c)(2)).
7. [X] Amendments to the claims of the International Application under PCT Article 19(35 U.S.C. 371(c)(3))
   a. [ ] are attached hereto (required only if not communicated by the International Bureau).
   b. [ ] have been communicated by the International Bureau.
   c. [ ] have not been made; however, the time limit for making such amendments has NOT expired.
   d. [XX] have not been made and will not be made.
8. [ ] An English language translation of the amendments to the claims under PCT Article 19 (35 U.S.C371(c)(3)).
9. [ ] An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).
10. [ ] An English language translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).

Items 11 to 16 below concern document(s) or information included:

11. [ ] An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
12. [ ] An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
13. [X] A FIRST preliminary amendment.
    [ ] A SECOND or SUBSEQUENT preliminary amendment.
14. [ ] A substitute specification.
15. [ ] A change of power of attorney and/or address letter.
16. [X] Other items or information:

copy of International Search Report (see copy of PCT International Application No. PCT/KR00/00811)
unsigned Declaration/Power of Attorney
copy of Notification of Receipt of Record Copy
copy of Form PCT/IB/308

JC08 Rec'd PCT/PTO 28 MAR 2001

U.S. APPLICATION NO. (if known, see 37 CFR 1.5)	INTERNATIONAL APPLICATION NO.	ATTORNEY'S DOCKET NUMBER
09/806172 NOT YET ASSIGNED	PCT/KR00/00811	GB-4151PCT 618701-2

17. [X] The following fees are submitted:

BASIC NATIONAL FEE (37 CFR 1.492 (a) (1) - (5)):

Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO and International Search Report not prepared by the EPO or JPO **$1000.00**

International preliminary examination fee (37 CFR 1.482) not paid to USPTO but International Search Report prepared by the EPO or JPO **$860.00**

International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1.445(a)(2)) paid to USPTO **$710.00**

International preliminary examination fee paid to USPTO (37 CFR 1.482) but all claims did not satisfy provisions of PCT Article 33(1)-(4) **$690.00**

International preliminary examination fee paid to USPTO (37 CFR 1.482) and all claims satisfied provisions of PCT Article 33(1)-(4) **$100.00**

	CALCULATIONS PTO USE ONLY	
ENTER APPROPRIATE BASIC FEE AMOUNT =	$ 1000.00	
Surcharge of **$130.00** for furnishing the oath or declaration later than [ ] 20 [ ] 30 months from the earliest claimed priority date (37 CFR 1.492(e)).	$	

CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE		
Total claims	19 - 20 =	0	X **$18.00**	$ 0	
Independent claims	2 - 3 =	0	X **$80.00**	$ 0	
MULTIPLE DEPENDENT CLAIM(S) (if applicable)		0*	+ **$270.00**	$ 0	
TOTAL OF ABOVE CALCULATIONS =				$ 1000.00	
[XX] Applicant claims small entity status. See 37 CFR 1.27. The fees indicated above are reduced by 1/2.				$ 500.00	
SUBTOTAL =				$ 500.00	
Processing fee of **$130.00** for furnishing the English translation later than [ ] 20 [ ] 30 months from the earliest claimed priority date (37 CFR 1.492(f)). +				$	
TOTAL NATIONAL FEE =				$ 500.00	
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). **$40.00** per property +				$	
TOTAL FEES ENCLOSED =				$ 500.00	
*PRELIMINARY AMENDMENT DELETING MULTIPLE DEPENDENCIES ENCLOSED HEREWITH.				**Amount to be refunded:**	$
				charged:	$

a. [XX] A check in the amount of $ 500.00 to cover the above fees is enclosed.

b. [ ] Please charge my Deposit Account No. _____ in the amount of $_____ to cover the above fees. A duplicate copy of this sheet is enclosed.

c. [XX] The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. 12-0415. A duplicate copy of this sheet is enclosed.

NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pendin g status.

SEND ALL CORRESPONDENCE TO:

LADAS & PARRY
5670 Wilshire Blvd., #2100
Los Angeles, California 90036-5679

Telephone No.: (323) 934-2300
Telefax No.: (323) 934-0202

March 28, 2001
DATE

SIGNATURE:

Mavis S. Gallenson
NAME

32,464
REGISTRATION NUMBER

09/806172

JC08 Rec'd PCT/PTO 28 MAR 2001

EL652176640US

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Jong Woo LEE	Re: Preliminary Amendment
U.S. Appln. No.: not yet assigned	Group: not yet assigned
U.S. Filing Date: concurrently herewith	Examiner: not yet assigned
International Application No: PCT/KR00/00811	
International Filing Date: 27 July 2000	Our Ref.: B-4151PCT 618701-2
For: "ADAPTER HAVING SECURE FUNCTION AND COMPUTER SECURE SYSTEM USING IT"	Date: March 28, 2001

Commissioner of Patents and Trademarks
Box PCT
Washington, D.C. 20231

Attn: United States Designated/Elected Office (DO/EO/US)

Sir:

Prior to examination of the above-identified application, it is respectfully requested that the following amendments be made to the Claims:

IN THE CLAIMS

Please replace original Claims 5 and 7 with amended Claims 5 and 7, which are set forth below. (Appendix A, which is enclosed herewith, shows how original Claims 5 and 7 were amended to produce amended Claims 5 and 7.)

5. (Amended) The secure adapter according to Claim 1, further employing safe memory operation under the secure mode set by an application program executed in the computer system, said safe memory comprising:

a safe memory interface to transmit a password transmitted from the main processor, or the password and the data which requires security ("secure data"), to an encryption/key operation processor,

and to transmit the data received from a decoder to the main processor;

an encryption/key operation processor to convert the password to the key ("the safe key"), and then, if the secure data is not received together with the password from the safe memory interface, to transmit the safe key to the decoder and to encrypt the password with the safe key by encryption algorithm and calculate the integrity identification value of the encrypted password ("password integrity identification value") and then to transmit the password integrity identification value to a comparison/processor, and, if the secure data is received together with the password from the safe memory interface, to encrypt the secure data with the safe key and calculate the integrity identification value of the encrypted secure data ("encrypted data integrity identification value") and then to transmit the encrypted data integrity identification value together with the "encrypted data" to the comparison/processor;

a comparison/processor to transmit the stored data to the decoder if two integrity identification values are the same after comparing the "password integrity identification value" received from the encryption/key operation processor with the "password integrity identification value" stored in the data storage memory, to transmit password nonconformity to the computer and delete the temporally stored safe key on the decoder if the values are not the same, and to transmit the data to the data storage memory where "encrypted data" and "encrypted data integrity identification value" together with "password integrity identification value" are received from the encryption/key operation processor;

a data storage memory to store the encrypted data, the encrypted data integrity identification value and the password integrity identification value; and

a decoder to decode the encrypted data from the data storage memory with the safe key and then to transmit the decoded data to the safe memory interface,

to transmit the safe key to the decoder and to encrypt the password with the safe key by encryption algorithm and calculate the integrity identification value of the encrypted password ("password integrity identification value") and then to transmit the password integrity identification value to a comparison/processor, and, if the secure data is received together with the password from the safe memory interface, to encrypt the secure data with the safe key and calculate the integrity identification value of the encrypted secure data ("encrypted data integrity identification value") and then to transmit the encrypted data integrity identification value together with the "encrypted data" to the comparison/processor;

a comparison/processor to transmit the stored data to the decoder if two integrity identification values are the same after comparing the "password integrity identification value" received from the encryption/key operation processor with the "password integrity identification value" stored in the data storage memory, to transmit password nonconformity to the computer and delete the temporally stored safe key on the decoder if the values are not the same, and to transmit the data to the data storage memory where "encrypted data" and "encrypted data integrity identification value" together with "password integrity identification value" are received from the encryption/key operation processor;

a data storage memory to store the encrypted data, the encrypted data integrity identification value and the password integrity identification value; and

a decoder to decode the encrypted data from the data storage memory with the safe key and then to transmit the decoded data to the safe memory interface,

wherein, where the said safe memory is employed, the main processor additionally has the function to transmit the password input request command to the computer system, and to transmit the password received from the keyboard to the safe memory, if the secure mode setup command received from the application program of

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the computer system is for the safe memory.

13. (New) The secure adapter according to Claim 3, further employing safe memory operation under the secure mode set by an application program executed in the computer system, said safe memory comprising:

a safe memory interface to transmit a password transmitted from the main processor, or the password and the data which requires security ("secure data"), to an encryption/key operation processor, and to transmit the data received from a decoder to the main processor;

an encryption/key operation processor to convert the password to the key ("the safe key"), and then, if the secure data is not received together with the password from the safe memory interface, to transmit the safe key to the decoder and to encrypt the password with the safe key by encryption algorithm and calculate the integrity identification value of the encrypted password ("password integrity identification value") and then to transmit the password integrity identification value to a comparison/processor, and, if the secure data is received together with the password from the safe memory interface, to encrypt the secure data with the safe key and calculate the integrity identification value of the encrypted secure data ("encrypted data integrity identification value") and then to transmit the encrypted data integrity identification value together with the "encrypted data" to the comparison/processor;

a comparison/processor to transmit the stored data to the decoder if two integrity identification values are the same after comparing the "password integrity identification value" received from the encryption/key operation processor with the "password integrity identification value" stored in the data storage memory, to transmit password nonconformity to the computer and delete the temporally stored safe key on the decoder if the values are not the same, and to transmit the data to the data storage memory where

"encrypted data" and "encrypted data integrity identification value" together with "password integrity identification value" are received from the encryption/key operation processor;

a data storage memory to store the encrypted data, the encrypted data integrity identification value and the password integrity identification value; and

a decoder to decode the encrypted data from the data storage memory with the safe key and then to transmit the decoded data to the safe memory interface,

wherein, where the said safe memory is employed, the main processor additionally has the function to transmit the password input request command to the computer system, and to transmit the password received from the keyboard to the safe memory, if the secure mode setup command received from the application program of the computer system is for the safe memory.

14. (New) The secure adapter according to Claim 4, further employing safe memory operation under the secure mode set by an application program executed in the computer system, said safe memory comprising:

a safe memory interface to transmit a password transmitted from the main processor, or the password and the data which requires security ("secure data"), to an encryption/key operation processor, and to transmit the data received from a decoder to the main processor;

an encryption/key operation processor to convert the password to the key ("the safe key"), and then, if the secure data is not received together with the password from the safe memory interface, to transmit the safe key to the decoder and to encrypt the password with the safe key by encryption algorithm and calculate the integrity identification value of the encrypted password ("password integrity identification value") and then to transmit the password integrity identification value to a comparison/processor, and, if

the secure data is received together with the password from the safe memory interface, to encrypt the secure data with the safe key and calculate the integrity identification value of the encrypted secure data ("encrypted data integrity identification value") and then to transmit the encrypted data integrity identification value together with the "encrypted data" to the comparison/processor;

a comparison/processor to transmit the stored data to the decoder if two integrity identification values are the same after comparing the "password integrity identification value" received from the encryption/key operation processor with the "password integrity identification value" stored in the data storage memory, to transmit password nonconformity to the computer and delete the temporally stored safe key on the decoder if the values are not the same, and to transmit the data to the data storage memory where "encrypted data" and "encrypted data integrity identification value" together with "password integrity identification value" are received from the encryption/key operation processor;

a data storage memory to store the encrypted data, the encrypted data integrity identification value and the password integrity identification value; and

a decoder to decode the encrypted data from the data storage memory with the safe key and then to transmit the decoded data to the safe memory interface,

wherein, where the said safe memory is employed, the main processor additionally has the function to transmit the password input request command to the computer system, and to transmit the password received from the keyboard to the safe memory, if the secure mode setup command received from the application program of the computer system is for the safe memory.

15. (New) A computer secure system comprising the secure adapter, the keyboard and the computer system according to Claim 2, where a separate secure key for entering secure mode setup/clearing

command is incorporated in said keyboard and/or the secure mode setup/clearing command can be created by the combination of existing key codes, the computer system has the secure key creation function, the encryption/decoding function with the secrete key and the encryption/decoding function with the secure key, and the keyboard manager with application program interface is included.

16. (New) A computer secure system comprising the secure adapter, the keyboard and the computer system according to Claim 3, where a separate secure key for entering secure mode setup/clearing command is incorporated in said keyboard and/or the secure mode setup/clearing command can be created by the combination of existing key codes, the computer system has the secure key creation function, the encryption/decoding function with the secrete key and the encryption/decoding function with the secure key, and the keyboard manager with application program interface is included.

17. (New) A computer secure system comprising the secure adapter, the keyboard and the computer system according to Claim 4, where a separate secure key for entering secure mode setup/clearing command is incorporated in said keyboard and/or the secure mode setup/clearing command can be created by the combination of existing key codes, the computer system has the secure key creation function, the encryption/decoding function with the secrete key and the encryption/decoding function with the secure key, and the keyboard manager with application program interface is included.

18. (New) A computer secure system comprising the secure adapter, the keyboard and the computer system according to Claim 5, where a separate secure key for entering secure mode setup/clearing command is incorporated in said keyboard and/or the secure mode setup/clearing command can be created by the combination of existing key codes, the computer system has the secure key creation function,

the encryption/decoding function with the secrete key and the encryption/decoding function with the secure key, and the keyboard manager with application program interface is included.

19. (New) A computer secure system comprising the secure adapter, the keyboard and the computer system according to Claim 6, where a separate secure key for entering secure mode setup/clearing command is incorporated in said keyboard and/or the secure mode setup/clearing command can be created by the combination of existing key codes, the computer system has the secure key creation function, the encryption/decoding function with the secrete key and the encryption/decoding function with the secure key, and the keyboard manager with application program interface is included.

REMARKS

This Preliminary Amendment amends Claims 5 and 7 so that these claims are no longer multiply dependent. New claims 12-19 have been added to provide similar coverage. The Applicant may elect to amend Claims 5 and 7 to make them again multiply dependent or to add additional claims to this application to provide coverage similar to, broader than, or narrower than the present claims at any time during the pendency of the above-identified U.S. application.

Respectfully submitted,

Mavis S. Gallenson
Reg. No. 32,464
Attorney for Applicant
LADAS & PARRY
5670 Wilshire Boulevard #2100
Los Angeles, California 90036
(323) 934-2300

Enclosure: Appendix A (2 pages)

09/806172
JC08 Rec'd PCT/PTO 28 MAR 2001

Appendix A

5. (Amended) The secure adapter according to [any one of Claims]Claim 1 [through 4], further employing safe memory operation under the secure mode set by an application program executed in the computer system, said safe memory comprising:

a safe memory interface to transmit a password transmitted from the main processor, or the password and the data which requires security ("secure data"), to an encryption/key operation processor, and to transmit the data received from a decoder to the main processor;

an encryption/key operation processor to convert the password to the key ("the safe key"), and then, if the secure data is not received together with the password from the safe memory interface, to transmit the safe key to the decoder and to encrypt the password with the safe key by encryption algorithm and calculate the integrity identification value of the encrypted password ("password integrity identification value") and then to transmit the password integrity identification value to a comparison/processor, and, if the secure data is received together with the password from the safe memory interface, to encrypt the secure data with the safe key and calculate the integrity identification value of the encrypted secure data ("encrypted data integrity identification value") and then to transmit the encrypted data integrity identification value together with the "encrypted data" to the comparison/processor;

a comparison/processor to transmit the stored data to the decoder if two integrity identification values are the same after comparing the "password integrity identification value" received from the encryption/key operation processor with the "password integrity identification value" stored in the data storage memory, to transmit password nonconformity to the computer and delete the temporally stored safe key on the decoder if the values are not the same, and to transmit the data to the data storage memory where "encrypted data" and "encrypted data integrity identification value"

together with "password integrity identification value" are received from the encryption/key operation processor;

a data storage memory to store the encrypted data, the encrypted data integrity identification value and the password integrity identification value; and

a decoder to decode the encrypted data from the data storage memory with the safe key and then to transmit the decoded data to the safe memory interface,

wherein, where the said safe memory is employed, the main processor additionally has the function to transmit the password input request command to the computer system, and to transmit the password received from the keyboard to the safe memory, if the secure mode setup command received from the application program of the computer system is for the safe memory.

7. (Amended) A computer secure system comprising the secure adapter, the keyboard and the computer system according to [any one of Claims]Claims 1 [through 6], where a separate secure key for entering secure mode setup/clearing command is incorporated in said keyboard and/or the secure mode setup/clearing command can be created by the combination of existing key codes, the computer system has the secure key creation function, the encryption/decoding function with the secrete key and the encryption/decoding function with the secure key, and the keyboard manager with application program interface is included.

EL915796642US

Applicant or Patentee: Jongwoo LEE Attorney's Docket No.: B-4151PCT 618701-2
U.S. Serial or U.S. Patent No.: 09/806,172
Filed or Issued: concurrently herewith
International Application No. PCT/KR00/00811, filed 27 July 2000
For: "ADAPTER HAVING SECURE FUNCTION AND COMPUTER SECURE SYSTEM USING IT"

VERIFIED STATEMENT (DECLARATION) CLAIMING SMALL ENTITY STATUS
37 CFR 1.9(F) AND 1.27(C) - SMALL BUSINESS CONCERN

I hereby declare that I am:

[ ] the owner of the small business concern identified below:

[X] an official of the small business concern empowered to act on behalf of the concern identified below:

Name of Concern: SAFE TECHNOLOGY CO., LTD.

Address of Concern: Room No. Gongjang-Dong 405, Jungahng Induspia, 517-13 Sangdaewon 1-Dong, Jungwon-Gu, Sungnam-City, Gyeonggi-Do, 462-806, REPUBLIC OF KOREA

I hereby declare that the above identified small business concern qualifies as a small business concern as defined in 13 CFR 121.3-18, and reproduced in 37 CFR 1.9(d), for purposes of paying reduced fees under Section 41(a) and (b) of Title 35, United States Code, in that the number of employees of the concern, including those of its affiliates, does not exceed 500 persons. For purposes of this statement, (1) the number of employees of the business concern is the average over the previous fiscal year of the concern of the persons employed on a full-time, part-time or temporary basis during each of the pay periods of the fiscal year, and (2) concerns are affiliates of each other when either, directly or indirectly, one concern controls or has the power to control the other, or a third party or parties controls or has the power to control both.

I hereby declare that rights under contract or law have been conveyed to and remain with the small business concern identified above with regard to the invention, entitled: "SOLID ELECTROLYTES USING ABSORBENT AND METHODS FOR PREPARING THEM" by inventor(s): Dong Hun Jang, Sa Heum KIM, Han Jun KIM, and Seung Mo OH described in:

[ ] the specification filed herewith.

[XX] application serial no.: 09/806,172, filed _____

[XX] International Application No. PCT/KR99/00797, filed 21 December 1999.

If the rights held by the above identified small business concern are not exclusive, each individual, concern or organization having rights to the invention is listed below*, and no rights to the invention are held by any person, other than the inventor, who could not qualify as a small business concern under 37 CFR 1.9(c) or by any concern which would not qualify as a small business concern under 37 CFR 1.9(d) or a non-profit organization under 37 CFR 1.9(e). *NOTE: Separate verified statements are required from each named person, concern or organization having rights to the invention averring to their status as small entities. (37 CFR 1.27)

FULL NAME _____

ADDRESS _____

[ ] INDIVIDUAL [ ] SMALL BUSINESS CONCERN [ ] NONPROFIT ORGANIZATION

VERIFIED STATEMENT (DECLARATION) CLAIMING SMALL ENTITY STATUS
37 CFR 1.9(F) AND 1.27(C) - SMALL BUSINESS CONCERN

(PAGE 2)

I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. [37 CFR 1.28(b)]

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application, any patent issuing thereon, or any patent to which this verified statement is directed.

Name of Person Signing: Jong Woo Lee

Title of Person Other Than Owner: President

Address of Person Signing: 101-901, Hansung Apt., 698-2, pungduck chun-ri, Suji-eub, Yongin-Si, Kyeong ki-do 449-840, Korea.

Signature: Jong Woo Lee Date: 22/6/2001

ADAPTER HAVING SECURE FUNCTION AND COMPUTER SECURE SYSTEM USING IT

Technical Field

This invention relates to adapter ("secure adapter"), to be installed and used between a computer system and a keyboard, which provides security function, and secure computer system using thereof, in particular, to configuration for transferring input information from keyboard to computer system in secure mode by encrypting the data, and for transferring information to computer system in clear mode without encryption.

Background Art

Development of computers and rapid growth of information exchange and communications over Internet has opened the way for quick and easy access to information. In particular, Internet brings a representative paradigm of creating informational environment for individuals, business and e-trade. Internet features openness and conformity, and surmounts difficulties in exchanging and sharing information resources whether used by an individual or a company, whereas the basic drawback of the Internet with respect to information protection and communication safety has been putting serious obstacles. Thus, what is needed is information secure system, which is operable for each service type or application whether communication

is trusted or not, as is the case with information exchange over the Internet, .

While development of information and computer communication enabled electronic transactions such as stock exchange, Internet banking, and other cyber transactions, when using Internet or modem communications, user's information (data) is often drained to other persons by illegal methods including hacking by third persons. For an experienced hacker, information stored on a computer connected to the Internet can be almost as available as the data on the same system. Thus, one cannot say information is safe just because it is stored on someone's computer. Additionally, as technical, marketing and other information is much transferred over the Internet and other media, and electronic transactions and economic activities are frequently performed, it is urgently required to safely protect each individual's information.

Normally, all data inputted from the computer keyboard is transferred, stored and processed in the computer system as is. That it is, the computer operates by using direct connection between the keyboard and the system: the keyboard controller of the computer system receives a key code from the keyboard access port, transmits it to the computer system, and then application program in the computer system receives and uses this value.

Accordingly, if a third person can receive this value from the keyboard port using hacking technique or get it somehow from keyboard controller, this can bring far-reaching effect when an unauthorized person is able to use someone's private data illegally.

Thus, the object of the present invention is to solve the above problems in full and to tackle related technical issues.

That is, the object of the present invention is to prevent information (data) from being drained by other persons using methods not intended by user, such as hacking, enabling the user setting up a secure connection between the computer system and the keyboard for entering data from the keyboard into the computer system .

Also, in the case of with additional safe memory, since the data can be encrypted/decoded only when the user supplies password, and the encryption password is not stored or preserved separately, the present invention can cope with such problems as reproduction and can deal with storing and processing of the data which requires secure handling.

Summary of Invention

To achieve the aforementioned objects, the present invention, which is an adapter to transfer key code input information from the keyboard to the computer system, is configured to transfer the key code input information from the keyboard to the computer system after encrypting it only when the secure mode setup command is received from the keyboard or the computer system, and to transfer the information from the keyboard to the computer system without encrypting the data if the secure mode clear command is received or when in the clear secure mode state.

At the secure mode, the encrypted key code input information may be the

information from all key codes, and only the character and numeral key codes other than special key codes, depending on setup configuration.

Secure mode can be setup/cleared by using a special key ("secure key"), which is additionally installed on the keyboard, or using a combination of existing keys (e.g., CTRL key + ALT key + SHIFT key + S key). Also, the application program under execution in the computer system can set up or clear the secure mode depending on the given conditions, although the user does not control the secure mode with the key.

Disclosure of Invention

The configuration, for example, of a secure adapter for secure mode setup/clearing comprises the main processor to process secure mode setup/clearing commands and to create the secrete key in secure mode setting, the initial cipher to transfer the secrete key transmitted from the main processor to the keyboard controller of the computer system by encrypting the secrete key with the secure key from the computer system, and the stream cipher to encrypt the key code input information from the keyboard with the secrete key.

With reference to Fig. 1, more detailed configuration, as possible embodiment of the secure adapter in the present invention, comprises:

a computer connection coupled to the keyboard port of the computer;

a keyboard connection coupled to the keyboard plug;

a transmit/receive control on the computer to control communication with the computer system;

a transmit/receive control on the keyboard to control communication with the keyboard;

a main processor to create a secrete key, to perform secure mode setup/clearing according to the secure mode commands, and to exchange the data between the computer system and the keyboard;

an initial cipher to encrypt the secrete key transferred from the main processor with the secure key from the computer system and then transmit the encrypted secret key to the computer system when the secure mode is set up; and,

a stream cipher to encrypt the key code input information with the secrete key from the main processor and then to transmit the encrypted information to the computer system when the secure mode is set up.

Said transmit/receive control on the computer writes all information to be transmitted on the input buffer first so that the control program transmits it at a proper time, and all received messages are written on the input buffer and can be used in other modules.

Said transmit/receive control on the keyboard transmits the key code input information from the keyboard to the main processor, all commands transmitted are written on the buffer and this module transmits them at a proper time.

Said stream cipher encrypts information transmitted from the main processor with the secrete key. While each different encryption function is applied because bits or characters of a plain text are encrypted, and thus different encryption function is applied and respective plain text bit is encrypted irregardless of other bits for stream cipher,

unlike block cipher for which the same encryption function is applied to all plain texts, its encrypting speed is relatively high. Also, the impact of channel errors occurring in a certain bit during encryption or transmission process is advantageously applied only to the corresponding bit, but not propagated to other bits. However, configuration using block cipher instead of stream password can be used, if necessary.

For computer connection and keyboard connection, 5V power is normally supplied, and they are connected with a communication line. However, the secure adapter of the present invention is not necessarily to be a device separated from the keyboard and the computer system in design, and can be coupled with the computer body or with the keyboard. In this case, the transmit/receive means of the computer body and the keyboard may not be a cable, but the system can be designed so that radio information transmitter is installed on the keyboard and radio information receiver is installed on the computer body. In the Fig. 2, an example of a secure adapter connected between the computer system and the keyboard as an independent device is shown. On the secure adapter, an indication lamp showing operating state and a secure mode indication lamp (described below) are installed.

A secure adapter of the present invention may include one or more indication lamps. These indication lamps show the operation mode of the secure adapter, the secure mode indication lamp shows secure state, and so on. In this case, the secure mode indication lamp is controlled by the main processor. Under secure mode, the secure mode indication lamp is on, and goes off when secure mode is cleared, while the lamp periodically blinks when secure mode state is disabled. The disabled secure mode state means the case when setting of the computer system, the secure key and/or the

secrete key was not performed normally. The secure mode indication lamp is not only installed on the secure adapter, but on the front of the computer body, the keyboard or on the monitor as the case may be. If necessary, a small indicator (i.e., an icon type, etc.) can be displayed on the setup screen on the monitor to prompt whether the secure mode is set up or not.

Depending on the case, safe memory interworking with the main configuration of the secure adapter may be added. Said safe memory operates under the secure mode that an application program executed on the computer system established in necessary case, and is used for storing and processing encrypted data which requires separate security handling.

More specifically, said safe memory comprises:

a safe memory interface to transmit a password transmitted from the main processor, or the password and the data which requires security ("secure data"), to an encryption/key operation processor, and to transmit the data received from a decoder to the main processor;

an encryption/key operation processor to convert the password to the key ("the safe key"), and then, if the secure data is not received together with the password from the safe memory interface, to transmit the safe key to the decoder and to encrypt the password with the safe key by encryption algorithm and calculate the integrity identification value of the encrypted password ("password integrity identification value") and then to transmit the password integrity identification value to a comparison/processor, and, if the secure data is received together with the password from the safe memory interface, to encrypt the secure data with the safe key and

calculate the integrity identification value of the encrypted secure data ("encrypted data integrity identification value") and then to transmit the encrypted data integrity identification value together with the "encrypted data" to the comparison/processor;

a comparison/processor to transmit the stored data to the decoder if two integrity identification values are the same after comparing the "password integrity identification value" received from the encryption/key operation processor with the "password integrity identification value" stored in the data storage memory, to transmit password nonconformity to the computer and delete the temporally stored safe key on the decoder if the values are not the same, and to transmit the data to the data storage memory where "encrypted data" and "encrypted data integrity identification value" together with "password integrity identification value" are received from the encryption/key operation processor;

a data storage memory to store the encrypted data, the encrypted data integrity identification value and the password integrity identification value; and

a decoder to decode the encrypted data from the data storage memory with the safe key and then to transmit the decoded data to the safe memory interface.

In this case, the main processor of the secure adapter additionally has a function to transmit the password input request command to the computer system where the secure mode setup command received from the application program of the computer system is for the safe memory, and to transmit the password received from the keyboard to the safe memory.

The safe memory does not store password separately, and executes decoding using the safe key converted from the password only when the user enters the same

password as the password used for storing the encrypted data. Whether the correct password is entered is acknowledged as valid access only when values are the same after comparing the "password integrity identification value" stored in the encrypted data of the data storage memory with the "password integrity identification value" calculated after encryption with the safe key converted from the newly entered password.

Therefore, the safe key transferred from the encryption/key operation processor to the decoder is temporally stored on the buffer of the decoder and then the key is deleted from the buffer by the command from the comparison/processor, where the stored "password integrity identification value" and the "password integrity identification value" calculated from the newly entered password are not the same, as the result of execution of the comparison/processor.

The conversion of password to a safe key may be executed using various known methods such as hash function or polynomial algorithms. Representative examples are the MAC hash function, the MDC hash function, the MD4 hash function, the MD5 hash function, the SHA hash function, the CRC algorithm, and so on.

The integrity identification protects data against hacker's active attacks because it is used as a means to identify the person who performs the access. As a method to identify the integrity, various known algorithms described above can be used, in particular Cyclic Redundancy Checking (CRC) algorithm is preferred. In transmitting the data of K bits, the CRC algorithm transmits the data of k+n bits by dividing the transmitted data into n+1 bit patterns and adding the remaining of n bits length occurred

at the division to the end of data bits. The algorithm can be adjusted so that the data is organized as n bits at the point to receive the data and the received data is divided by the pattern, and then data transmission errors are found through the remaining values. Where the remainder is 0 at the point to receive the data, it is considered that there are no data transmission errors, and there are data transmission errors where it is 1. Accordingly, in the present invention, the data transmission error identification algorithm configuration in communication is transformed and used, as the method to store the values to the data storage memory by calculating the CRC value ("encrypted data CRC value") of the data encrypted with the safe key converted from password and the CRC value of password ("password CRC value"), and to compare the "password CRC value" calculated from the password entered by the user with the "password CRC value" stored on the data storage memory when an application program of the computer system intends to acquire the data under the secure state. Thus, if the stored CRC value and the newly calculated CRC value are the same, it is confirmed that the user who entered the same password with the password used in data storage has now access to the computer system. In the above, n is 16 or 32 bits. In the present invention, 16 bits are preferably used.

The encryption algorithm used for encrypting with the safe key can be selected among various known encryption algorithms, or a separate algorithm can be developed and used.

The "password integrity identification value" and the "encrypted data integrity identification value" are stored together in the data storage memory, the "password integrity identification value" being used to identify whether the password to newly

enter data is correct, while the "encrypted data integrity identification value" being used to identify whether the encrypted data is stored without errors or with errors during storage. That is, it is possible to identify the above by repeatedly encrypting the decoded data with the safe key, calculating the integrity identification value of the encrypted data, and comparing the value with the encrypted data integrity identification value written on the data storage memory. Therefore, it is possible to confirm whether errors occurred in storing or decoding the encrypted data, by adding a separate module that can execute such a function or adding such a function to the basic configuration module.

On the other hand, if each different password is used in storing the multitude of encrypted data at the same time or several times to the data storage memory, a different "password integrity identification value" is stored respectively for the encrypted data. That is to say, passwords may be set differently in storing data, and thus may be specific to the type of encrypted data. Accordingly, if necessary, it is possible to establish the password integrity identification value of the encrypted data stored on the data storage memory depending on the type of encrypted data. In the drain process of the encrypted data, all encrypted data with the same "password integrity identification value" are decoded.

The encryption algorithm used in the safe memory may differ from the encryption algorithm used in the stream cipher of the secure adapter.

The present invention also relates to the computer security system, which comprises the secure adapter, the keyboard and the computer system.

A separate secure key for entering the secure mode setup/clearing command is incorporated in the keyboard and/or the secure mode setup/clearing command is created by the combination of existing key codes. The computer system has the secure key creation function, the encryption/decoding function with the secrete key and the encryption/decoding function with the secure key, and includes the keyboard manager with application program interface. The application program interface has the function to perform direct decoding in the application program of the computer system and/or provides the function with which the operating system of the computer system can perform decoding.

The secure key created in the keyboard manager of the computer system is transmitted to the secure adapter in setting the secure mode. When the secure key transmitted to the secure adapter encrypts the newly created secrete key from the adapter in each secure mode setup, and then retransmits the encrypted secrete key to the computer system. The secure adapter transmits the key code value entered from the keyboard to the computer system after encrypting the value with the secrete key. Then, the computer system processes the encrypted key code input information transmitted from the secure adapter after decoding the information with the stored secrete key.

The computer system includes general operating system, application programs and so on in addition to the keyboard manager. The function to decode encrypted information may be incorporated to the keyboard manager, the operating system and/or application programs. Wherein, there are protocols between application programs and the keyboard manager, and between the operating system and the keyboard manager, to acquire the decoded information. This is to prevent the case that a third person can

misuse the external interface of the keyboard for hacking purposes.

Referring now to the Fig.3, an example that the computer system can be executed under Microsoft Windows 98 and the keyboard manager has the decoding function is described below. However, in addition to Windows 98, corresponding protocols are applicable for Windows 2000, Windows/NT, Unix, Linux and so on.

When the computer system is operated, the keyboard manager makes and sends the secure key to the secure adapter. Then the manager receives the secrete key encrypted by the secure key from the secure adapter in secure mode, and then receives key code input information encrypted by the secrete key from the secure adapter. The encrypted key code input information received from the secure adapter by the keyboard manager is not immediately decoded, but stored in a location of the keyboard manager or the computer system and only the signal that any key code is pressed is sent to the application program interface by the operating system.

On the one hand, when an application program needs to examine the transferred key code during operation, the application program interface interrupts the code and requests decoding of the key code first pressed to the keyboard manager. Then the keyboard manager transfers the stored encrypted key code input information to the application program interface after decoding it with the stored secrete key, and then the application program interface returns the decoded information to the application program as the result of examination.

With reference, if booting process of the computing system of the present

invention is checked, BIOS operation, LOADER operation, KERNEL operation, keyboard manager operation and O.S operation is performed in sequence in applying power. Therefore, since the keyboard manager is executed while O.S is being loaded after a computer is energized, the keyboard manager is executed earlier than general hacking or application programs.

On the other hand, when the secure mode is cleared, the keyboard input information is not encrypted and transferred to the keyboard manager and then directly to application programs through the operating system.

Referring now to the Fig.4, an example when safe memory is added to the main configuration of the secure adapter of the present invention is described below. This embodiment is defined to only the case when the integrity identification value is calculated using the CRC algorithm.

If storage or processing commands of the data which requires security together with the secure mode setup command from the application program of the computer system are sent to the main processor, the main processor switches the system to secure mode and sends the password input request command to the computer system. If the computer system prompts for password input on screen, the user supplies the password, the password is transferred to the main processor through the keyboard transmit/receive control, and the main processor sends it to the interface of the safe memory.

If the secure mode setup command from the application program is for data storage requiring security, the data from an application program is transferred to the

main processor and then the main processor receives and transfers the data to the safe memory interface. If the safe memory interface transfers password and the secure data to the encryption/key operation processor, the encryption/key operation processor converts the password to the safe key and encrypts the secure data and the password, using the safe key. On the other hand, the encryption/key operation processor calculates the CRC values of the encrypted password and the encrypted data, and then transmits the "encrypted data", the "password CRC value" and the "encrypted data CRC value" to the comparison/processor. The comparison/processor records the information to the data storage memory (refer to the Fig.8).

In the meantime, if the secure mode setup command from the application program is for decoding the stored encrypted information, only the password transferred to the safe memory interface is sent to the encryption/key operation processor. The encryption/key operation processor encrypts password with the safe key after converting the password to the safe key, calculates the CRC value of the encrypted password ("password CRC value"), and then respectively transmits the "safe key" to the decoder, and the "password CRC value" to the comparison/processor. The comparison/processor scans the data storage memory and confirms whether the "password CRC value" stored in the memory is equal to the "password CRC value" received from the encryption/key operation processor. If two CRC values are equal, the comparison/processor receives and transfers the encrypted data from the data storage memory to the decoder. The decoder decodes the encrypted data from the comparison/processor with the safe key, and deletes the safe key after transmission of the data to the safe memory interface. If two values are not equal, the comparison/processor deletes the safe key stored on the decoder buffer and transmits

password nonconformity to the computer system (refer to Fig.9).

The process that the decoded data is encrypted again with the secrete key in the stream cipher and transmitted to the computer system is the same as the aforementioned description for the main configuration of a secure adapter. However, as the case may be, it is possible to organize the process where the data decoded in and transmitted from the safe memory can be transferred to the computer system without repeated encryption in the stream cipher.

The present invention also relates to a method to secure the key code input information transferred from the keyboard using the secure computer system.

In particular, the method comprises the steps for:

transferring a secure key created in the keyboard manager of the computer system to the secure adapter in computer booting;

creating a new secrete key in the main processor when the secure mode setup command from the keyboard or the computer system is transferred to the main processor of the secure adapter, and then transferring the secrete key to the initial cipher and the stream cipher of the secure adapter;

encrypting the secrete key with the secure key in the initial cipher and then transferring the encrypted secrete key to the keyboard manager through the computer connection by the transmit/receive control on the computer;

under secure mode, main processor transferring the information to the stream cipher if the key code input information of the keyboard is transferred to the main processor through the transmit/receive control on the keyboard, the stream cipher's

encrypting the key code input information with the secrete key and transferring the encrypted information to the keyboard manager through computer connection by the transmit/receive control on the computer;

computer system decoding the encrypted information using the secrete key;

main processor transferring the secure mode clearing command to the stream cipher when the secure mode clearing command is transferred from the keyboard or the computer system to the main processor of the secure adapter; and

when secure mode is cleared, the stream cipher transferring the transferred key code input information to the keyboard manager through the computer connection by the transmit/receive control on the computer without encryption, if the key code input information of the keyboard is transferred to the stream cipher through the transmit/receive control on the keyboard after passing through the keyboard connection.

Where the safe memory is incorporated into the main configuration of a secure adapter, the configuration further comprises the step of: main processor transferring the password from the transmit/receive control on the keyboard and the secure data from the transmit/receive control on the computer to the safe memory after the main processor transfers the password input request command to the computer system, and safe memory encrypting and then storing the received data using the password, if secure mode setup is made by the command from the application program of the computer system and also for data storage requiring security; but

main processor transferring the password from the transmit/receive control on the keyboard to the safe memory after the main processor transfers the password input request command to the computer system, and safe memory decoding the encrypted data with the password and then transferring the decoded data to the main processor

where the password is correct, but not decoding the encrypted data where not correct, if secure mode setup is made by the command from the application program of the computer system and also for acquisition of the secure data.

On the basis of the Fig. 1 operation process of a secure adapter is described below in secure mode setting/clearing by the computer secure system of the present invention.

When the computer is booted (the process when the power is applied, operating system is initiated and then the computer goes into operation state), the keyboard manager of the computer system (not shown) transfers the secure key to the main processor through the computer connection by the transmit/receive control on the computer. The main processor turns on the operating indication lamp and sends the secure key to the initial cipher.

On the other hand, the key code input information from the keyboard is transferred to the main processor through the keyboard connection by the transmit/receive control on the keyboard. The main processor turns on the secure mode indication lamp, creates and transfers the secrete key to the initial cipher and the stream cipher, and also the key code input information to the stream cipher, if the input information transferred from the keyboard is for secure mode setup. The initial cipher encrypts the secrete key with the secure key, and sends the encrypted secrete key to the keyboard manager of the computer system through the computer connection by the transmit/receive control on the computer. On the other hand, the stream cipher transfers the encrypted information to the keyboard manager of the computer system through the

computer connection by the transmit/receive control of the computer after encrypting the key code input information, using the secrete key transmitted from the main processor. The process to handle the encrypted key code input information, transferred to the keyboard manager, in the computer system is referred to the details described before on the Fig.3 basis.

If the secure mode clearing command is directed from the computer system or the keyboard, the clear command is transferred to the main processor and the stream cipher by the transmit/receive control on the computer or the transmit/receive control on the keyboard. The main processor turns off the secure mode indication lamp and transfers the secure mode clearing command to the stream cipher. Thereafter, key code values transferred from the keyboard are transferred to the computer system through the computer connection by the transmit/receive control on the computer, without encryption in the stream cipher.

The process to handle the not-encrypted key code input information, transferred to the keyboard manager in the computer system is referred to the details described before on the basis of the Fig.3.

If the secure key is not acquired from the keyboard manager of the computer system during booting the computer, the secure adapter goes in the disabled secure mode, and the main processor sends periodical ON and OFF signals to the secure mode indication lamp. Then, by the keyboard manager and the decoded data transfer protocol, the disabled secure mode state may be notified on the monitor as a message type and so on, and the keyboard input information is transferred to the keyboard manager without

encryption.

In Fig.5 through Fig.7, the secure mode setup process, the secure mode clear process and key code input information processing process under the secure mode of the present invention is shown in more details.

The Fig.8 shows the data storage process after encrypting data in the secure adapter with the incorporated safe memory, and the Fig.9 shows the process to decode the encrypted data.

Those who are skilled in prior art may assume various changes and modifications within the scope of the present invention on the basis of the above description.

Brief Description of Drawings

Fig. 1 shows a configuration of the module as an embodiment of a secure adapter according to the present invention;

Fig. 2 shows a view of an embodiment of a secure adapter, of the present invention, with connection between a computer system and a keyboard using cables;

Fig. 3 shows a schematical diagram of a computer system in a computer secure system of the present invention;

Fig. 4 shows a configuration of a module that the safe memory is incorporated to a secure adapter of the Fig.1;

Fig. 5 shows steps for secure mode setup in the present invention;

Fig. 6 shows steps for clearing secure mode in the present invention;

Fig. 7 shows steps for processing key code input information under secure mode;

Fig. 8 shows steps for encrypting and storing data in a secure adapter of the Fig. 4; and

Fig. 9 shows steps for decoding stored data in a secure adapter of the Fig. 4.

Industrial Applicability

If the secure adapter and the secure computer system employing thereof of the invention are used, it is possible to prevent third person from intruding into the computer system by hacking and stealing user's secrete data, for stock exchange, Internet banking, cyber transactions and other communications over the Internet, modem communications or for network data transfer.

What is claimed is:

1. A secure adapter to transfer key code input from a keyboard to a computer system, characterized in a configuration to transfer input from the keyboard to the computer system after encryption if a secure mode setup command is received from the keyboard or the computer system, and to transfer the input from the keyboard to the computer system without encryption if a secure mode clearing command is received or under cleared secure mode.

2. A secure adapter according to Claim 1, further comprising:

a main processor to process the secure mode setup/clear command and to create a secrete key in setting secure mode;

an initial cipher to encrypt the secrete key transferred from the main processor with the secure key from the computer system and then to transfer the encrypted secrete key to the computer system; and

a stream cipher to encrypt the key code input information from the keyboard with the secrete key and then to transfer the encrypted information to the computer system.

3. A secure adapter according to Claim 1, further comprising:

a computer connection coupled to a keyboard port of the computer;

a keyboard connection coupled to a keyboard plug;

a transmit/receive control on the computer to control communication with the computer system;

a transmit/receive control on the keyboard to control communication with the

keyboard;

a main processor to create a secrete key, to perform secure mode setup/clearing according to the secure mode related commands, and to inter-transmit information of the computer system and the keyboard;

an initial cipher to encrypt the secrete key from the main processor with a secure key from the computer system and then to transmit the encrypted secrete key to the computer system, under secure mode; and

a stream cipher to encrypt the key code input information with the secrete key from the main processor and then to transmit the encrypted information to the computer system, under secure mode.

4. The secure adapter according to Claim 1, further comprising a built-in secure mode indication lamp which is ON under secure mode, OFF under cleared secure mode, and periodically blinks under disabled secure mode.

5. The secure adapter according to any one of Claims 1 through 4, further employing safe memory operation under the secure mode set by an application program executed in the computer system, said safe memory comprising:

a safe memory interface to transmit a password transmitted from the main processor, or the password and the data which requires security ("secure data"), to an encryption/key operation processor, and to transmit the data received from a decoder to the main processor;

an encryption/key operation processor to convert the password to the key ("the safe key"), and then, if the secure data is not received together with the password from the safe memory interface, to transmit the safe key to the decoder and to encrypt the

password with the safe key by encryption algorithm and calculate the integrity identification value of the encrypted password ("password integrity identification value") and then to transmit the password integrity identification value to a comparison/processor, and, if the secure data is received together with the password from the safe memory interface, to encrypt the secure data with the safe key and calculate the integrity identification value of the encrypted secure data ("encrypted data integrity identification value") and then to transmit the encrypted data integrity identification value together with the "encrypted data" to the comparison/processor;

a comparison/processor to transmit the stored data to the decoder if two integrity identification values are the same after comparing the "password integrity identification value" received from the encryption/key operation processor with the "password integrity identification value" stored in the data storage memory, to transmit password nonconformity to the computer and delete the temporally stored safe key on the decoder if the values are not the same, and to transmit the data to the data storage memory where "encrypted data" and "encrypted data integrity identification value" together with "password integrity identification value" are received from the encryption/key operation processor;

a data storage memory to store the encrypted data, the encrypted data integrity identification value and the password integrity identification value; and

a decoder to decode the encrypted data from the data storage memory with the safe key and then to transmit the decoded data to the safe memory interface,

wherein, where the said safe memory is employed, the main processor additionally has the function to transmit the password input request command to the computer system, and to transmit the password received from the keyboard to the safe memory, if the secure mode setup command received from the application program of

the computer system is for the safe memory.

6. The secure adapter as claimed in Claim 5, where the said integrity identification value is calculated using the CRC algorithm.

7. A computer secure system comprising the secure adapter, the keyboard and the computer system according to any one of Claims 1 through 6, where a separate secure key for entering secure mode setup/clearing command is incorporated in said keyboard and/or the secure mode setup/clearing command can be created by the combination of existing key codes, the computer system has the secure key creation function, the encryption/decoding function with the secrete key and the encryption/decoding function with the secure key, and the keyboard manager with application program interface is included.

8. A method to secure key code input information comprising the steps of:

transferring a secure key created in the keyboard manager of the computer system to the secure adapter in computer booting;

creating a new secrete key in the main processor when the secure mode setup command from the keyboard or the computer system is transferred to the main processor of the secure adapter, and then transferring the secrete key to the initial cipher and the stream cipher of the secure adapter;

encrypting the secrete key with the secure key in the initial cipher and then transferring the encrypted secrete key to the keyboard manager through the computer connection by the transmit/receive control on the computer;

under secure mode, main processor transferring the information to the stream

cipher if the key code input information of the keyboard is transferred to the main processor through the transmit/receive control on the keyboard, the stream cipher's encrypting the key code input information with the secrete key and transferring the encrypted information to the keyboard manager through computer connection by the transmit/receive control on the computer;

computer system decoding the encrypted information using the secrete key;

main processor transferring the secure mode clearing command to the stream cipher when the secure mode clearing command is transferred from the keyboard or the computer system to the main processor of the secure adapter; and

when secure mode is cleared, the stream cipher transferring the transferred key code input information to the keyboard manager through the computer connection by the transmit/receive control on the computer without encryption, if the key code input information of the keyboard is transferred to the stream cipher through the transmit/receive control on the keyboard after passing through the keyboard connection.

9. The method according to Claim 8, further characterized in that the decoding function using said secrete key is served by said keyboard manager of the computer system, or the operating system and/or application programs.

10. The method according to Claim 8, further characterized in that a protocol for acquiring decoded data exists between the keyboard manager and the application program, and between the keyboard manager and the application program.

11. The method according to Claim 8, further comprising the steps of:

main processor transferring the password from the transmit/receive control on

the keyboard and the secure data from the transmit/receive control on the computer to the safe memory after the main processor transfers the password input request command to the computer system, and safe memory encrypting and then storing the received data using the password, if secure mode setup is made by the command from the application program of the computer system and also for data storage requiring security; but

main processor transferring the password from the transmit/receive control on the keyboard to the safe memory after the main processor transfers the password input request command to the computer system, and safe memory decoding the encrypted data with the password and then transferring the decoded data to the main processor where the password is correct, but not decoding the encrypted data where not correct, if secure mode setup is made by the command from the application program of the computer system and also for acquisition of the secure data.

DRAWINGS

FIG. 1

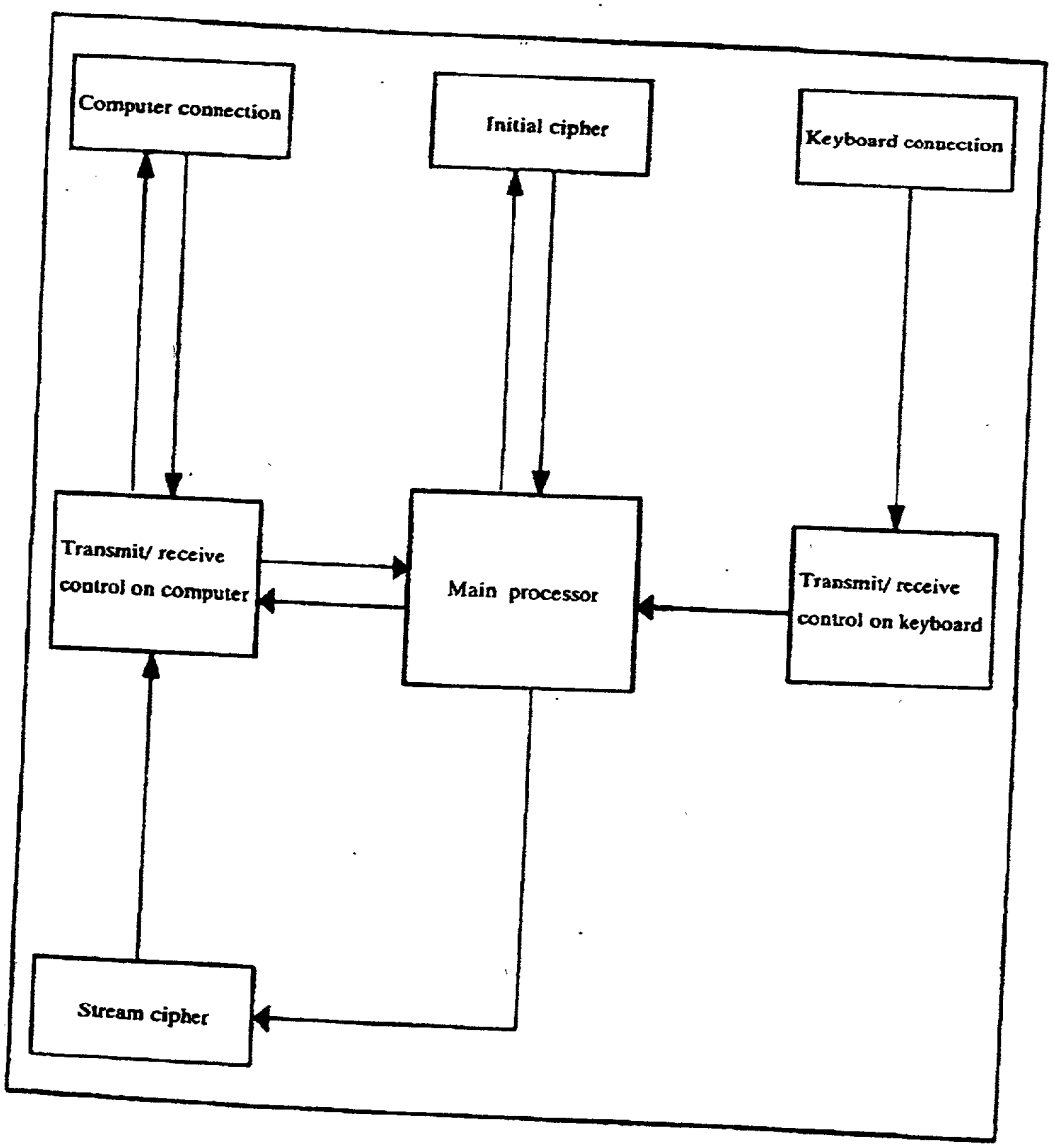


FIG. 2

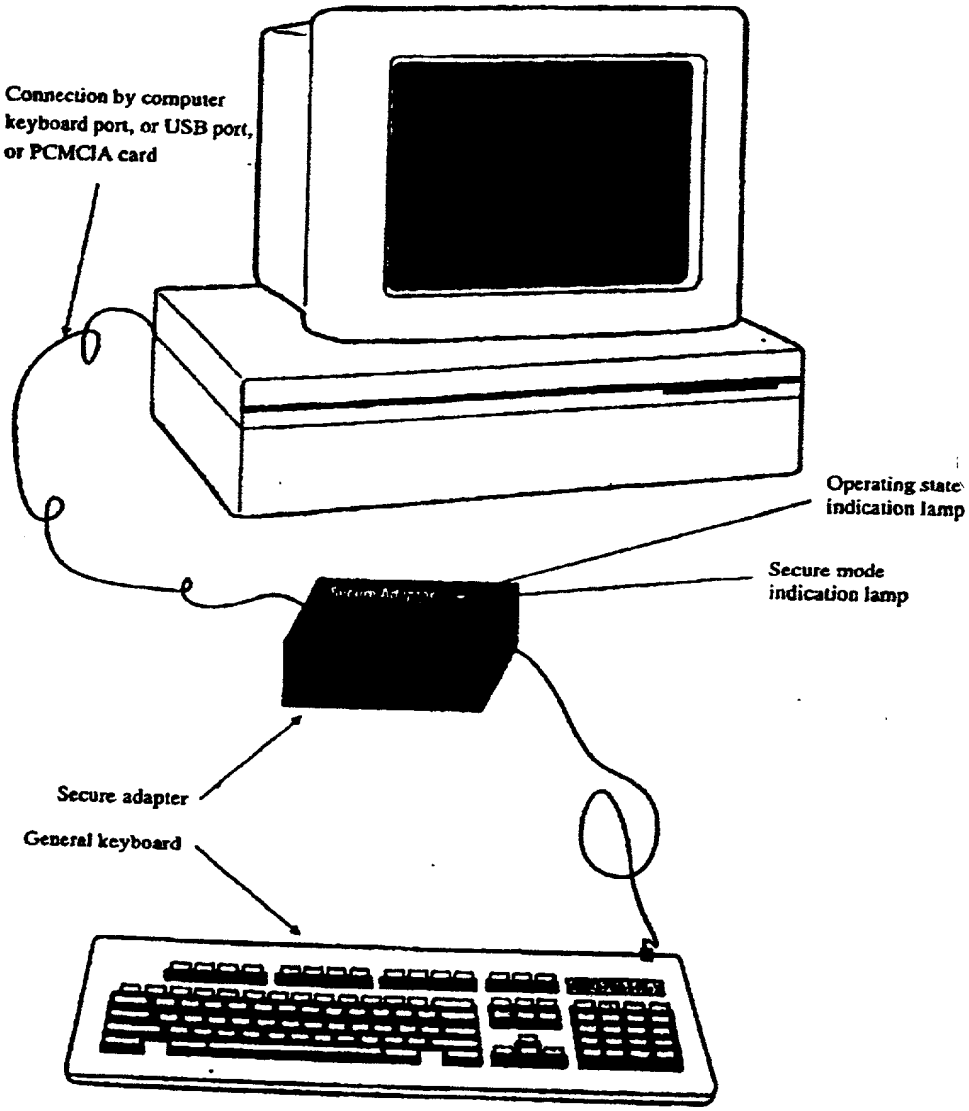

Connection by computer keyboard port, or USB port, or PCMCIA card
Operating state indication lamp
Secure mode indication lamp
Secure adapter
General keyboard

FIG. 3

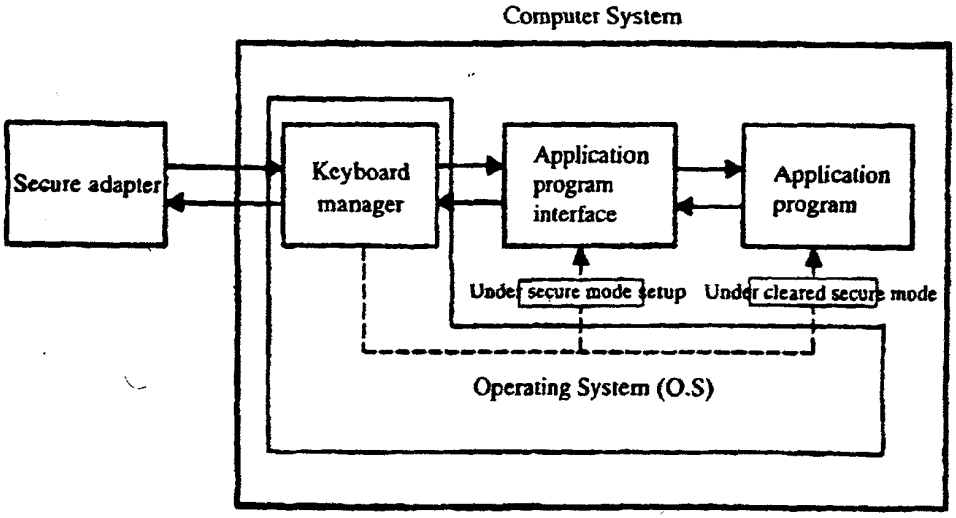

Computer System
Secure adapter
Keyboard manager
Application program interface
Application program
Under secure mode setup
Under cleared secure mode
Operating System (O.S)

FIG. 4

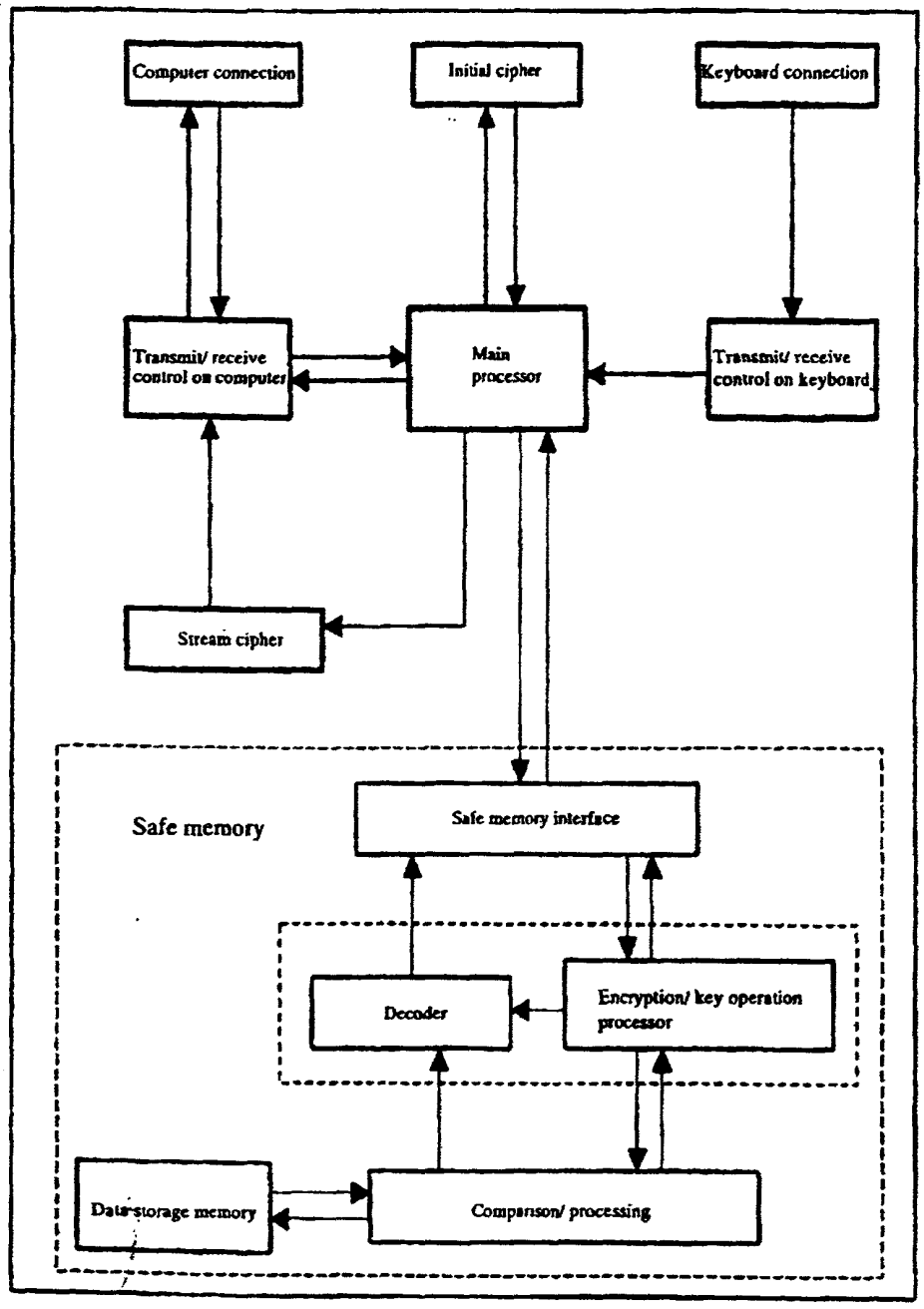

Computer connection
Initial cipher
Keyboard connection
Transmit/ receive control on computer
Main processor
Transmit/ receive control on keyboard
Stream cipher
Safe memory
Safe memory interface
Decoder
Encryption/ key operation processor
Data storage memory
Comparison/ processing

FIG. 5

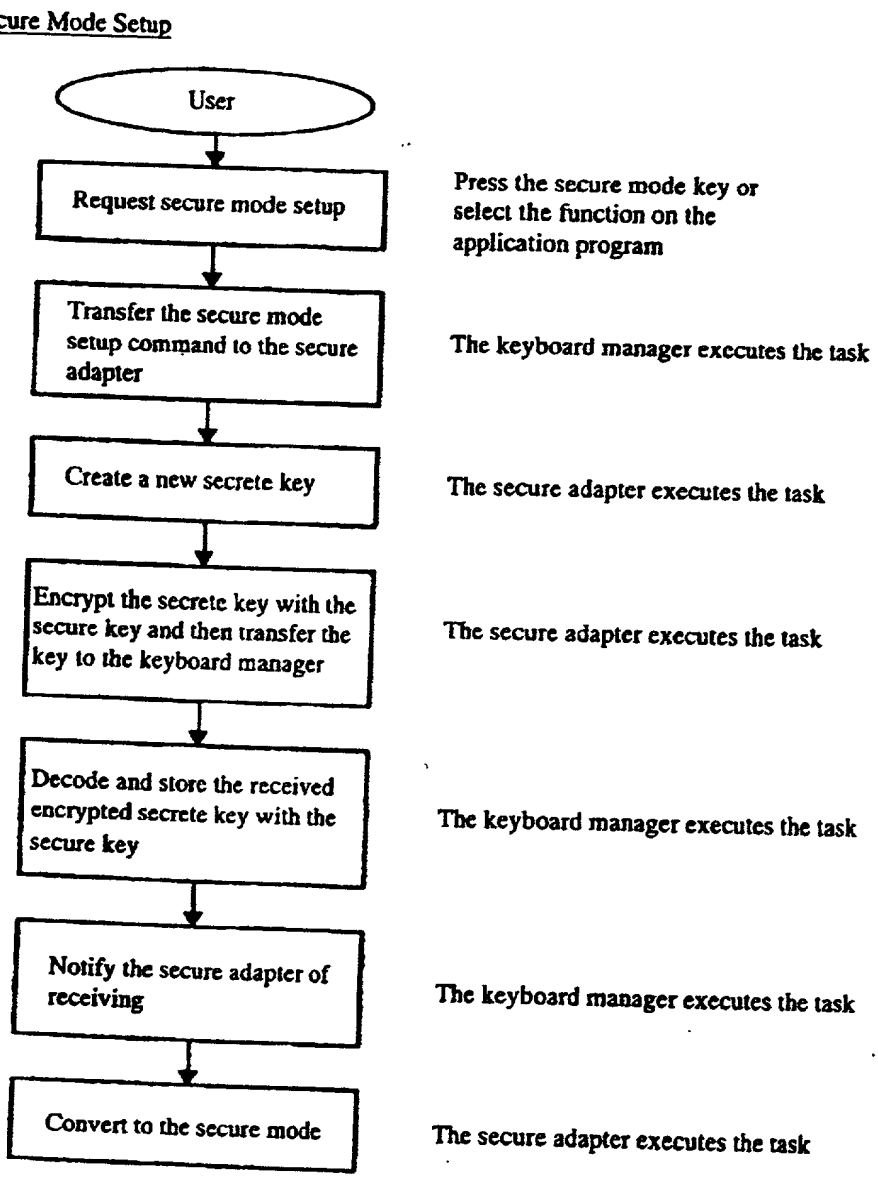

Secure Mode Setup
User
Request secure mode setup
Press the secure mode key or select the function on the application program
Transfer the secure mode setup command to the secure adapter
The keyboard manager executes the task
Create a new secrete key
The secure adapter executes the task
Encrypt the secrete key with the secure key and then transfer the key to the keyboard manager
The secure adapter executes the task
Decode and store the received encrypted secrete key with the secure key
The keyboard manager executes the task
Notify the secure adapter of receiving
The keyboard manager executes the task
Convert to the secure mode
The secure adapter executes the task

FIG. 6

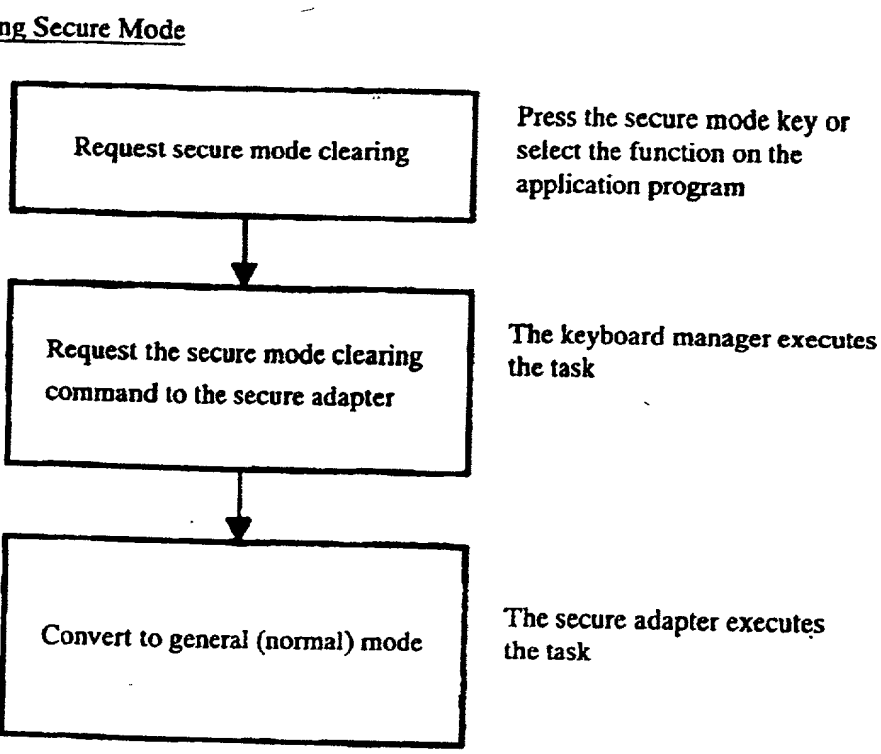

Clearing Secure Mode
Request secure mode clearing
Press the secure mode key or select the function on the application program
Request the secure mode clearing command to the secure adapter
The keyboard manager executes the task
Convert to general (normal) mode
The secure adapter executes the task

FIG. 7

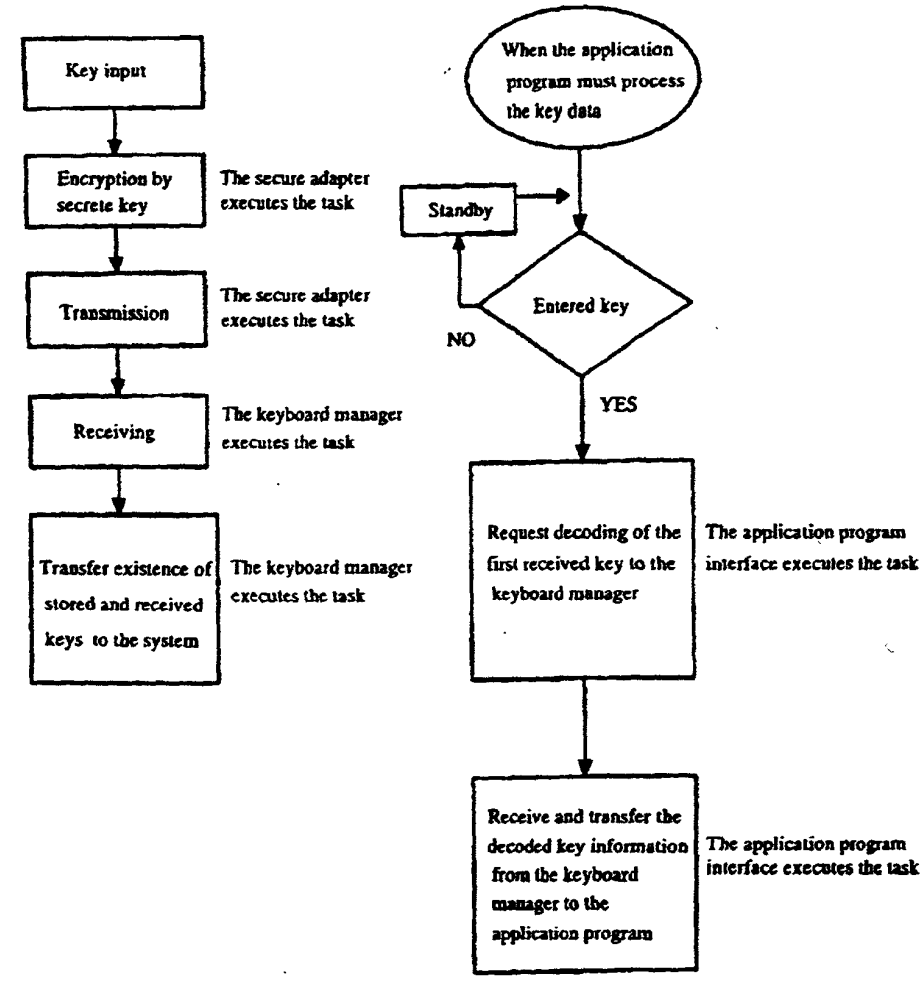

Key Data Processing under Secure Mode
Key input
Encryption by secrete key
The secure adapter executes the task
Transmission
The secure adapter executes the task
Receiving
The keyboard manager executes the task
Transfer existence of stored and received keys to the system
The keyboard manager executes the task
When the application program must process the key data
Standby
Entered key
NO
YES
Request decoding of the first received key to the keyboard manager
The application program interface executes the task
Receive and transfer the decoded key information from the keyboard manager to the application program
The application program interface executes the task

FIG. 8

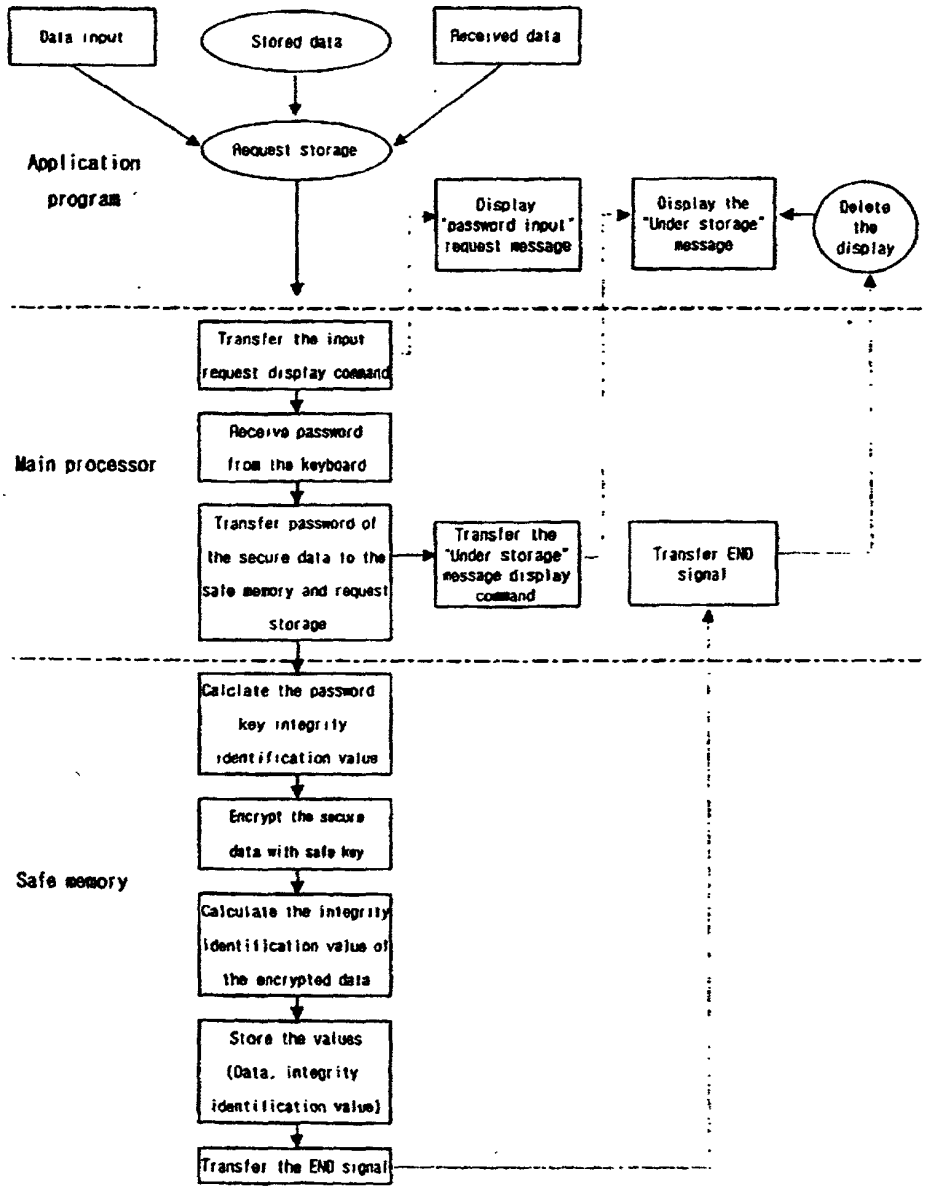
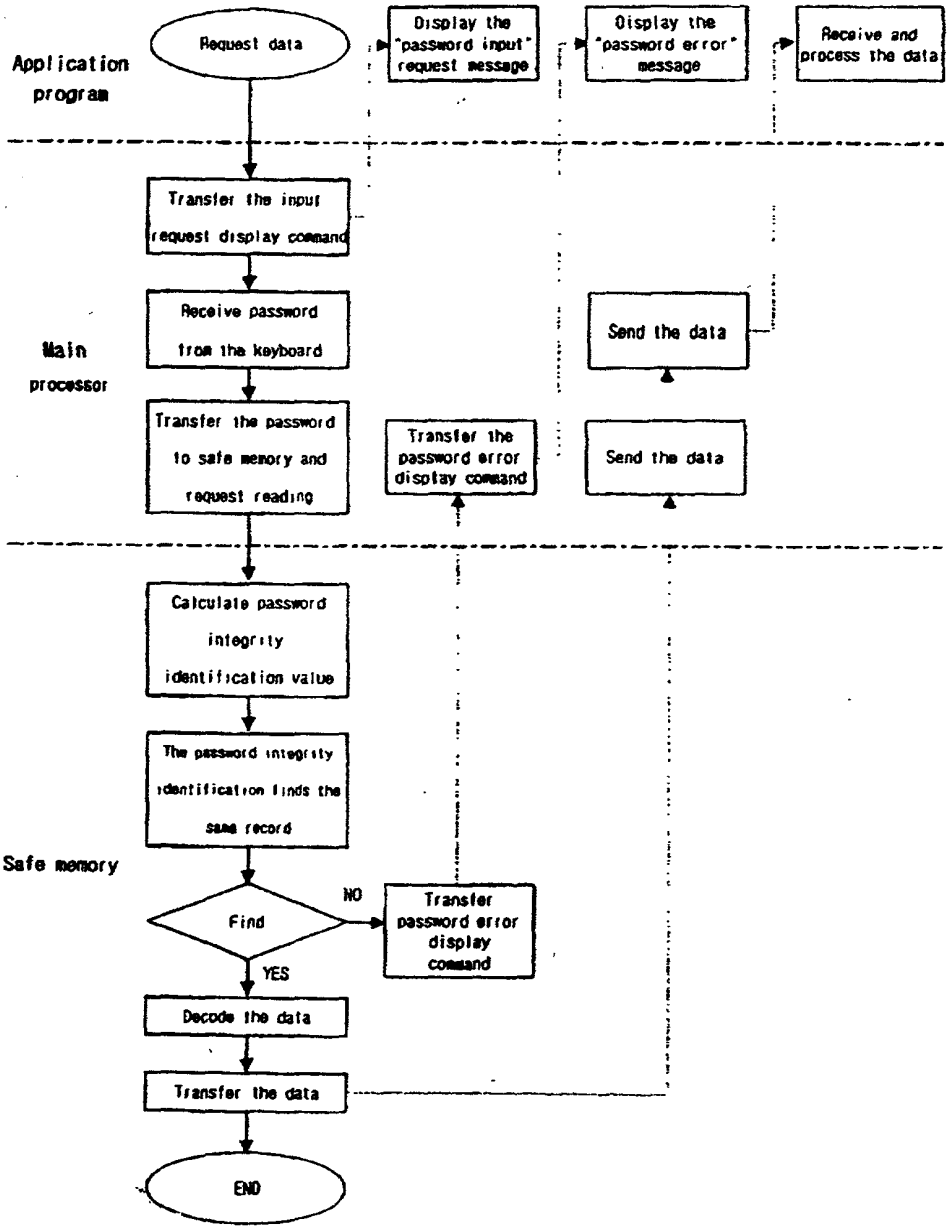

Data input
Stored data
Received data
Application program
Request storage
Display "password input" request message
Display the "Under storage" message
Delete the display
Main processor
Transfer the input request display command
Receive password from the keyboard
Transfer password of the secure data to the safe memory and request storage
Transfer the "Under storage" message display command
Transfer END signal
Safe memory
Calciate the password key integrity identification value
Encrypt the secure data with safe key
Calculate the integrity identification value of the encrypted data
Store the values (Data, integrity identification value)
Transfer the END signal

FIG. 9


Application program
Request data
Display the "password input" request message
Display the "password error" message
Receive and process the data
Transfer the input request display command
Main processor
Receive password from the keyboard
Send the data
Transfer the password to safe memory and request reading
Transfer the password error display command
Send the data
Calculate password integrity identification value
Safe memory
The password integrity identification finds the same record
Find
NO
Transfer password error display command
YES
Decode the data
Transfer the data
END

Attorney's Docket No. B-4151PCT 618701-2

COMBINED DECLARATION AND POWER OF ATTORNEY

(ORIGINAL, DESIGN, NATIONAL STAGE OF PCT, SUPPLEMENTAL, DIVISIONAL, CONTINUATION, OR CIP)

As a below named inventor, I hereby declare that:

TYPE OF DECLARATION

This declaration is of the following type: *(check one applicable item below)*

[X] original
[ ] design
[ ] supplemental

NOTE: If the declaration is for an International Application being filed as a divisional, continuation or continuation-in-part application, do not check next item; check appropriate one of last three items.

[X] national stage of PCT

NOTE: If one of the following 3 items apply, then complete and also attach ADDED PAGES FOR DIVISIONAL, CONTINUATION, OR CIP.

[ ] divisional
[ ] continuation
[ ] continuation-in-part (CIP)

INVENTORSHIP IDENTIFICATION

WARNING: If the inventors are each not the inventors of all the claims an explanation of the facts, including the ownership of all the claims at the time the last claimed invention was made, should be submitted.

My residence, post office address and citizenship are as stated below next to my name. I believe I am the original, first and sole inventor *(if only one name is listed below)* or an original, first and joint inventor *(if plural names are listed below)* of the subject matter which is claimed and for which a patent is sought on the invention entitled:

TITLE OF INVENTION

"ADAPTER HAVING SECURE FUNCTION AND COMPUTER SECURE SYSTEM USING IT"

SPECIFICATION IDENTIFICATION

the specification of which: *(complete (a), (b) or (c))*

(a) [ ] is attached hereto.
(b) [X] was filed on _____ as [X] U.S. Serial No. 09/ 806,172
or [ ] Express Mail No., *as Serial No. not yet known,* _____
and was amended on _____*(if applicable).*

NOTE: Amendments filed after the original papers are deposited with the PTO which contain new matter are not accorded a filing date by being referred to in the declaration. Accordingly, the amendments involved are those filed with the application papers or, in the case of a supplemental declaration, are those amendments claiming matter not encompassed in the original statement of invention or claims. See 37 CFR 1.67.

(c) [X] was described and claimed in
PCT International Application No. PCT/KR00/00811
filed on 27 July 2000 as amended under PCT Article 19 (1)
on ___ *(if any).*

ACKNOWLEDGMENT OF REVIEW OF PAPERS AND DUTY OF CANDOR

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above

I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code Federal Regulations § 1.56.

[ ] In compliance with this duty there is attached an information disclosure statement 37 CFR 1.97.

PRIORITY CLAIM

I hereby claim foreign priority benefits under Title 35, United States Code, § 119 of any foreign application(s) for patent or inventor's certificate or of any PCT international application(s) designating at least one country other than the United States of America listed below and have also identified below any foreign applications(s) for patent or inventor's certificate or any PCT international application(s) designating at least one country other than the United States of America filed by me on the same subject matter having a filing date before that of the application(s) of which priority is claimed.

(complete (d) or (e))

(d) [ ] no such applications have been filed
(e) [X] such applications have been filed as follows.

NOTE: Where item (c) is entered above and the International Application which designated the U.S. claimed priority check item (e), enter the details below and make the priority claim.

EARLIEST FOREIGN APPLICATION(S), IF ANY, FILED WITHIN 12 MONTHS (6 MONTHS FOR DESIGN(S)) PRIOR TO THIS U.S. APPLICATION

COUNTRY	APPLICATION NUMBER	DATE OF FILING (day, month, year)	PRIORITY CLAIMED UNDER 37 USC 119
KOREA	1999/31145	29 July 1999	[X] YES [ ] NO
			[ ] YES [ ] NO
			[ ] YES [ ] NO
			[ ] YES [ ] NO
			[ ] YES [ ] NO

ALL FOREIGN APPLICATION(S), IF ANY FILED MORE THAN 12 MONTHS (6 MONTHS FOR DESIGN(S)) PRIOR TO THIS U.S. APPLICATION

POWER OF ATTORNEY

As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith. *(List name and registration number)*

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(check the following item, if applicable)

[ ] Attached as part of this declaration and power of attorney is the authorization of the above-named attorney(s) to accept and follow instructions from my representative(s).

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DECLARATION

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

SIGNATURE(S)

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Inventor's signature

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